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Colloquia

Department of Mathematics

Summer 2015

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University of Dayton. Department of Mathematics

Abstracts of the Colloquium talks: Summer 2015

Date	Speaker and Title	Time/Location
Friday, Jun 5	Niwa Alkamisi and Tony Ellero, University of Dayton Chaudhuri-Hocquengham Codes, and Burst Error-Correcting Codes	3:00 PM, SC 323
Monday, Jul 13	Sami Aljhani and Adel Alshammari, University of Dayton A Green's function for a two-term second order differential operator	**2:00 PM, SC 323**
Monday, July 27	Yuan Tian, University of Dayton Optimal consumption and investment model comparison using Monte-Carol simulation	**1:45 PM, Sc 323**
Monday, July 27	Naher Alsafari, University of Dayton Two boundary value problems for fractional differential equations	**2:15 PM, SC 323**

Bose-Chaudhuri-Hocquengham Codes, and Burst Error-Correcting Codes

Njwa Alkamisi, Tony Ellero

Abstract: We explore the construction and decoding of three types of codes: Cyclic linear codes, Bose-Chaudhuri-Hocquengham Codes, and Burst Error-Correcting Codes. The goal is to construct a code that can effectively detect and correct errors with respect to data storage economy. Our study of codewords uses their corresponding polynomials, and the properties which make some polynomials more effective than others for code generation. We sometimes change our transmission strategies for channels where errors occur in bursts, instead of at random. Burst error correction has resulted in high quality reproduction of original sound from compact disc players.

A Green's Function for a Two-Term Second Order Differential Operator

Mohammed Aldandani, Sami Aljhani and Adel Alshammari

ABSTRACT: A series representation of the Green's function associated with the boundary value problem,

$$-u''(t) + a(t)u = w(t)f\big(t, u(t)\big), \quad 0 < t < 1, \quad u(0) = 0, \quad u'(1) = 0,$$

is constructed. Sufficient conditions on a are given such that the series representation converges uniformly on compact domains. An application of the contraction mapping principle is given to provide sufficient conditions for the existence and uniqueness of solutions of the boundary value problem. An application of the Schauder Fixed Point is given to provide sufficient conditions for the existence of solutions of the boundary value problem.

Optimal consumption and investment model comparison using Monte-Carol simulation

Yuan Tian

Abstract: This paper introduces three consumption-investment models, which are Merton's portfolio problem, optimal consumption and investment model with habit formation and model with shortfall aversion-alpha. First, I use Monte-Carlo simulation to plot each model's consumption and investment

allocation of total wealth respectively; then compare the three models and apply real data to verify if these models really work on as we expected.

Two Boundary Value Problems for Fractional Differential Equations

Naher Alsafri

Abstract: We consider a fractional differential equation of the form

$$D_0^{\propto}\, u(t) + h(t) = 0, \qquad 0 < t < 1$$

where $D_0^{\propto}$ denotes the Riemann-Liouville fractional derivative. First, for $\alpha = \frac{7}{2}$ we construct the Green's function for the boundary value problem,

$$D_0^{7/2}\, u(t) + h(t) = 0, \qquad 0 < t < 1,$$

$$u(0) = 0, u(1) = 0, \quad D_0^{3/2} u(0) = 0, \; D_0^{3/2}\; u(1) = 0$$

Since there are two boundary conditions specified at the right, this construction is new. Second, we assume $1 < \alpha \leq 2\, and\, 0 < x_2$ and obtain sufficient conditions for existence and uniqueness or sufficient conditions for existence of solutions of the boundary value problem,

$$D_0^{\propto}\, u(x) + h\big(x, u(x)\big) = 0, \quad 0 < x < x_2$$

$$u(0) = 0, \qquad u(x_2) = 0.$$

The contraction mapping principle and the Schauder fixed point theorem are respectively applied.